



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/540,113	03/31/2000	Wolfgang Renz		2414

7590 01/12/2004

SCHIFF HARDIN & WAITE
PATENT DEPARTMENT
7100 SEARS TOWER
233 S. WACKER DRIVE
CHICAGO, IL 60606-6473

EXAMINER

FETZNER, TIFFANY A

ART UNIT PAPER NUMBER

2859

DATE MAILED: 01/12/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/540,113	RENZ ET AL.	
	Examiner	Art Unit	
	Tiffany A Fetzner	2859	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 31 October 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-7,9 and 11-16 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-7,9 and 11-16 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. §§ 119 and 120

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 13) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.
- a) ☐ The translation of the foreign language provisional application has been received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s). _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED 1st action after RCE

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 10/31/2003 has been entered.

Canceled Claims

2. The examiner notes that **claims 8 and 10 have been canceled** by the RCE response of October 31st 2003.

Response to Arguments

3. Applicant's arguments filed 10/31/2003 have been fully considered but they are not persuasive. Applicant's amendments to the claims do overcome the prior art of **Srinivasan et al.**, US patent 5,602,479 issued February 11th 1997, without adding new matter however, the amendments to the claims also necessitated a new grounds for a new prior art search, therefore all of the previous rejections are **rescinded** in view of this first action after RCE.

Claim Rejections - 35 USC § 102

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

5. **Claims 1-6, 9, and 11-16** are rejected under **35 U.S.C. 102(b)** as being anticipated by **Wong et al.**, US patent 5,474,069 issued December 12th 1995.
6. **Claims 1-6, 9, and 11-16** are rejected under **35 U.S.C. 102(b)** as being anticipated by **Wong et al.**, US patent 5,372,137 issued December 13th 1994.
7. With respect to **Amended claim 1, Wong et al.**, patents **'069** and **'137** each teach "A nuclear magnetic resonance antenna comprising: a plurality of at least five antenna elements disposed in a plane" [See **Wong et al.**, patent **'069** col. 5 line 45 through col. 6 line 66; Figures 3 and 6 **Wong et al.**, patent **'137** col. 5 line 54 through col. 7 line 14; Figures 3 and 6] The **Wong et al.**, patents **'069** and **'137** each show that "each antenna element" (i.e. the thirty-six wedge shaped conductive segments identified as component number 45 shown in figures 3 and 6) "having an element beginning in said plane and an element end in said plane;" with "said antenna elements being disposed relative to a center axis" (i.e. center axis 13 shown in Figures 3 and 6) "so as to radiate from the respective element beginnings to the respective element ends outwardly in a spoke-like fashion to allow a radially directed current flow in each antenna element between the element end thereof and the element beginning thereof, and exhibiting cyclical symmetry from antenna element to antenna element;" [See **Wong et al.**, patent **'069** col. 5 line 45 through col. 6 line 66; Figures 3 and 6 **Wong et al.**, patent **'137** col. 5 line 54 through col. 7 line 14; Figures 3 and 6] The **Wong et al.**, patents **'069** and **'137** also each teach that "said antenna elements being at least magnetically coupled with each other in said antenna". [See **Wong et al.**, patent **'069**

col. 5 line 45 through col. 6 line 66; Figures 3 and 6 **Wong et al.**, patent '**137** col. 5 line 54 through col. 7 line 14; Figures 3 and 6].

8. With respect to **claim 2**, the **Wong et al.**, patents '**069** and '**137** each teach that "the respective element beginnings and the respective element ends are connected to ground". [See **Wong et al.**, patent '**069** col. 6 lines 48-50; Figures 3 and 6 **Wong et al.**, patent '**137** col. 6 lines 62-65 Figures 3 and 6] The same reasons for rejection, that apply to **claim 1** also apply to **claim 2**.

9. With respect to **claim 3**, the **Wong et al.**, patents '**069** and '**137** each teach and show that "said antenna elements are electrically coupled to each other." [See **Wong et al.**, patent '**069** col. 5 line 45 through col. 6 line 66; Figures 3 and 6 **Wong et al.**, patent '**137** col. 5 line 54 through col. 7 line 14; Figures 3 and 6]. The same reasons for rejection, that apply to **claim 1** also apply to **claim 3**.

10. With respect to **claim 4**, the **Wong et al.**, patents '**069** and '**137** each show that "the respective element beginnings are electrically connected to each other via a ring-shaped connecting element". [See **Wong et al.**, patent '**069** Figure 6 and **Wong et al.**, patent '**137** Figure 6; where the central inner ring shown is circular about axis 13 and connects the beginnings of components 45]. The same reasons for rejection, that apply to **claims 1, 3** also apply to **claim 4**.

11. With respect to **claim 5**, the **Wong et al.**, patents '**069** and '**137** each show that "the respective element ends are electrically connected to each other via a ring-shaped connecting element." [See **Wong et al.**, patent '**069** Figure 6 and **Wong et al.**, patent '**137** Figure 6; where the outer ring shown as circular component 42 about axis 13

connects the ends of components 45]. The same reasons for rejection, that apply to **claims 1, 3** also apply to **claim 5**.

12. With respect to **claim 6**, the **Wong et al.**, patents '**069** and '**137** each show that "the respective element beginnings are electrically connected to each other via a first ring-shaped connecting element and wherein the respective element ends are electrically connected to each other via a second ring-shaped connecting element". [See **Wong et al.**, patent '**069** Figure 6 and **Wong et al.**, patent '**137** Figure 6; where the central inner ring shown is circular about axis 13 and connects the beginnings of components 45 and where the outer ring shown as circular component 42 about axis 13 connects the ends of components 45]. The same reasons for rejection, that apply to **claims 1, 3, 4, and 5** also apply to **claim 6**.

13. With respect to **claim 9**, the **Wong et al.**, patents '**069** and '**137** each show that "the respective antenna elements are linear." [See **Wong et al.**, patent '**069** Figures 3, and 6 as well as **Wong et al.**, patent '**137** Figures 3 and 6; where the wedge shaped planar conductive segments are shown to be linear components.] The same reasons for rejection, that apply to **claims 1**, also apply to **claim 9**.

14. With respect to Amended **claim 13**, the **Wong et al.**, patents '**069** and '**137** each show that "said plurality is divisible by four" [See **Wong et al.**, patent '**069** col. 6 lines 48-50; Figures 3 and 6; and **Wong et al.**, patent '**137** col. 5 lines 57-59 Figures 3 and 6; because 36 divided by 4 is 9.] The same reasons for rejection, that apply to **claim 1** also apply to **claim 13**.

15. With respect to **New claim 14**, the **Wong et al.**, patents **'069 and '137** each show "A nuclear magnetic resonance antenna comprising: a plurality of at least five antenna elements" [See **Wong et al.**, patent **'069** col. 5 line 45 through col. 6 line 66; Figures 3 and 6 **Wong et al.**, patent **'137** col. 5 line 54 through col. 7 line 14; Figures 3 and 6], "each antenna element having an element beginning and an element end, the respective element beginnings defining an element beginning plane and the respective elements ends defining an element end plane, [See **Wong et al.**, patent **'069** Figures 3 and 6; as well as **Wong et al.**, patent **'137** Figures 3 and 6] with "said element beginning plane and said element end plane being parallel to and spaced from each other;" [See **Wong et al.**, patent **'069** Figures 3 and 6; as well as **Wong et al.**, patent **'137** Figures 3 and 6] Additionally, the **Wong et al.**, patents **'069 and '137** each show "said antenna elements being disposed relative to a center axis so as to radiate from the respective element beginnings to the respective element ends to allow a radially directed current to flow in each antenna element between the element end thereof and the element beginning thereof, and exhibiting cyclical symmetry from antenna element to antenna element; [See **Wong et al.**, patent **'069** col. 5 line 45 through col. 6 line 66; Figures 3 and 6 **Wong et al.**, patent **'137** col. 5 line 54 through col. 7 line 14; Figures 3 and 6], with "the respective antenna elements being linear and three-dimensionally straight to define respective line directions, said line directions intersecting said center axis at a common point outside of said element beginning plane and outside of said element end plane"; [See **Wong et al.**, patent **'069** Figures 3 and 6; as well as **Wong et al.**, patent **'137** Figures 3 and 6; where the point defined by axis13 is parallel to and

outside of the beginning plane and the end plane.] The **Wong et al.**, patents '**069** and '**137** also each teach that "said antenna elements being at least magnetically coupled with each other in said antenna". [See **Wong et al.**, patent '**069** col. 5 line 45 through col. 6 line 66; Figures 3 and 6 **Wong et al.**, patent '**137** col. 5 line 54 through col. 7 line 14; Figures 3 and 6]. The same reasons for rejection, that apply to **claim 1** also apply to **claim 14**.

16. With respect to **Amended claim 12**, the **Wong et al.**, patents '**069** and '**137** each teach and show "a grounding plate" (i.e. linear elements 40 taught and shown in combination with components 45 which are shown to be "disposed parallel to said element beginning plane and said element end plane". [See **Wong et al.**, patent '**069** col. 6 lines 41-53; Figures 3 and 6 **Wong et al.**, patent '**137** col. 6 lines 56-68; Figures 3 and 6; where the **Wong et al.**, patents '**069** and '**137** each teach that "The center leads on cables 46 and 47 are connected through capacitors 48 and 49 to a pair of linear elements 40, which are spaced apart in quadrature with each other and are located on diagonal axes 92 and 93 which intersect central axis 13. The shields on the cables 46 and 47 connect directly to the corresponding end cap segments 45 which serve as a signal ground". (i.e. this teaching directly implies that the linear elements 40 which are directly connected to the RF antenna end cap segments 45 are functionally effective grounding plates "disposed parallel to said element beginning plane and said element end plane" as shown in Figure 6 of both **Wong et al.**, references)]. The examiner also notes that the teaching also suggests a second interpretation that each wedge shaped end cap segment 45 when connected as taught is a component of a single grounding

plate, "disposed parallel to said element beginning plane" (i.e. the plane defined by the inner circular component about axis 13 as shown in Figure 6 of both **Wong et al.**, references) "and said element end plane". (i.e. the plane defined by the outer circular component ring 42 disposed about axis 13 as shown in Figure 6 of both **Wong et al.**, references.) The same reasons for rejection, that apply to **claims 1, 14** also apply to **claim 12**.

17. With respect to **Amended claim 11**, the **Wong et al.**, patents '**069** and '**137** each teach and show a grounding plate disposed parallel to said element beginning plane and said element end plane," for the same reasons as those provided in the rejection of **Amended claim 11**, which need not be reiterated. Additionally, the **Wong et al.**, patents '**069** and '**137** each teach that "The separate conductive segments 45 may also be directly connected together at the center of the end cap 42 without increasing eddy currents." [See **Wong et al.**, patent '**069** col. 6 lines 11-13; **Wong et al.**, patent '**137** col. 6 lines 23-26], This teaching with the wedge shaped segments directly connected at the center, (i.e. meeting at axis 13) requires that "said common point being disposed in said grounding plate", because each element 45 is also considered to be a component of a grounding plate as mentioned in the rejection of claim 12. The same reasons for rejection, that apply to **claims 1, 12, 14** also apply to **claim 11**.

18. With respect to **claim 15**, the **Wong et al.**, patents '**069** and '**137** each show that "the respective element beginnings are electrically connected to each other via a first ring-shaped connecting element and wherein the respective element ends are

electrically connected to each other via a second ring-shaped connecting element”.

[See **Wong et al.**, patent ‘**069** Figure 6 and **Wong et al.**, patent ‘**137** Figure 6; where the central inner ring shown is circular about axis 13 and connects the beginnings of components 45 and where the outer ring shown as circular component 42 about axis 13 connects the ends of components 45]. The same reasons for rejection, that apply to **claims 1, 14**, also apply to **claim 15**.

19. With respect to **New claim 16**, the **Wong et al.**, patents ‘**069** and ‘**137** each show that “said plurality is divisible by four” [See **Wong et al.**, patent ‘**069** col. 6 lines 48-50; Figures 3 and 6; and **Wong et al.**, patent ‘**137** col. 5 lines 57-59 Figures 3 and 6; because 36 divided by 4 is 9.] The same reasons for rejection, that apply to **claims 1, 14** also apply to **claim 16**.

Claim Rejections - 35 USC § 103

20. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

21. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

22. **Claim 7** is rejected under **35 U.S.C. 103(a)** as being unpatentable over **Wong et al.**, US patent 5,474,069 issued December 12th 1995.

23. **Claim 7** is rejected under **35 U.S.C. 103(a)** as being unpatentable over **Wong et al.**, US patent 5,372,137 issued December 13th 1994.

24. With respect to **claim 7**, the **Wong et al.**, patents '**069** and '**137** each lack teaching explicitly that "said antenna elements has two branching element ends", however, It would have been obvious to one of ordinary skill in the art at the time that the invention was made that as shown in Figure 6 of **Wong et al.**, patents '**069** and '**137** the wedge shaped antenna elements have two branching ends, (i.e. one at the element beginning and one at the element end because each of the components 45 "is wedge shaped"), therefore even though this feature is not explicitly taught, figure 6 is broadly interpreted by the examiner as directly suggesting this limitation.

25. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

A) McArthur US patent 2,735,074 issued Feb. 14th 1956; which shows a magnetic resonance reactance antenna device. [Figure 6]

B) Oppelt et al., US patent 5,153,517 issued Oct. 6th 1992; An MRI RF coil structure.

C) Hashoian et al., US patent 5,168,230 issued December 1st 1992. [See Figures 1, 2, 4 and the entire disclosure in general, since this reference is similar to, and cites the prior art Edelstein reference, the examiner suggests applicant review this reference in preparation for any future response.]

D) Prammer et al., US patent 6,268,726 issued July 31st 2001, filed January 15th 1999. [See Figures 4, 22a, 22b, 25, 26]. Which show an MR antenna in an NMR logging tool.

E) R.L. Barrish et al., US patent 2,281,404 issued April 28th 1942. Early MR RF antenna structure.

F) Pissanetzky et al., US patent 5,659,281 issued August 19th 1997. [See Figures 3a, 3b Which shows an MRI RF antenna coil structure].

G) Slade US patent 6,215,304 B1 issued April 10th 2001, filed January 19th 1999 with a priority date of January 21st 1998. [See Figure 3 which shows an RF antenna sensor for NMR well logging]

H) Definition number 4 of ¹radial on page 962 of **Merriam Webster's Collegiate Dictionary Tenth Edition 1997** =“developing uniformly around a central axis”.

I) Mansfield US patent 5,143,688 issued September 1st 1992 ; which shows an elliptical surface coil structure for use within magnetic fields.

J) Edelstein US patent 4,620,155 which shows a multi segment RF NMR antenna structure.

K) Srinivasan et al., US patent 5,602,479 issued February 11th 1997, which shows a multi segment RF NMR birdcage antenna structure where the antenna components are in more than one plane.

L) Srinivasan et al., US patent 6,177,797 B1 issued January 23rd 2001 [See figures 11a, 9a, 9b, and 10 which shows a multi segment RF NMR birdcage antenna structure where the antenna components are planar and volumetric.] Applicant please note that

this reference was noted in the most current prior art search, although this reference is not applied, it is prior art that should be considered by applicant in responding to this action because figure 11a is suggestive of applicant's claimed structure, even though the antenna elements are capacitors and inductors, taken as a whole; as opposed to the plurality of single conductive segments, (i.e. **Wong et al.**, components 45) as shown in the art applied. The examiner considers the applied art (i.e. the **Wong et al.**, references) to be an accurate match to applicant's specification, and invention as currently taught and claimed, however reference **L**) is still relevant prior art since applicant's claims do not preclude the inductor-capacitor combination for each antenna segment shown in Figure 11a.

Conclusion

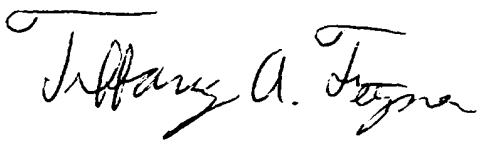
26. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tiffany Fetzner whose telephone number is: **until January 27th 2003** (703) 305-0430. After **January 27th 2003** (571) 272-2241. The examiner can normally be reached on Monday-Thursday from 7:00am to 4:30pm., and on alternate Friday's from 7:00am to 3:30pm.

27. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Diego Gutierrez, can be reached on (703) 308-3875: **until February 10th 2003** After **February 10th 2003** (571) 272-2245. The **only official fax phone number** for the organization where this application or proceeding is assigned is **(703) 872-9306**.

Application/Control Number: 09/540,113
Art Unit: 2859


Page 13

28. Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 305-0956.



TAF

January 5, 2004



Diego Gutierrez

Supervisory Patent Examiner

Technology Center 2800

CHRISTOPHER W. FULTON
PRIMARY EXAMINER